RETRIEVAL OF POLAR MESOPHERIC CLOUD GEOMETRY FROM LIMB OPTICAL DEPTH AT 290 AND 385 nm

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Abstract

This report presents a method for deriving information of the polar mesospheric cloud (PMC) geometry from simulated slant path optical depth (SPOD) at 290 and 385 nm for the upcoming satellite instrument of the Stratospheric Aerosol and Gas Experiment (SAGE) III. The geometry of the PMC can be specified by the cloud top and bottom altitudes along with the cloud horizontal extent. Assuming a cloud particle size distribution, the SPOD with the cloud influence can be determined by using standard air density and ozone concentration profiles. The specified signal-to-noise ratio (SNR) of the satellite instrument is used to simulate the SPOD measurement uncertainty. The SPODs at 290 and 385 nm can be used for detecting the presence of the PMC. To determine the PMC geometry, a nonlinear least squares curve fitting method is applied to the 385-nm SPOD at altitude regions generally below and above the cloud presence. The residual between the simulated SPOD and the fitted SPOD vertical distributions is then used to derived the PMC geometry. Examples of the application of the retrieval method will be described in detail.